

doubts, first, the accuracy of the determination, and adds that the *Volzia* was not found in the mottled marls, but in deposits "parallel to the Permian limestone."

The Zechstein (dolomites, dolomitic limestones, oolite, and gypsum), which reaches a great thickness in the provinces of Kazan and Samara, is a formation which was contemporary with the Permian marls, sandstones, and conglomerates which are widely spread in the provinces of Kazan, Nijni, Vyatka, Pern, Ufa, and Orenburg. On the places where both meet together, the Zechstein penetrates in the shape of thinner sheets into the marls. The copper sandstones of the Ural also would be, according to the same author, contemporary with the Zechstein. These marls and sandstones have a characteristic fauna, and MM. Stuckenber and Zaitseff discovered in them the following fossils:—*Lingula orientalis*, Golovk.; *Unio umbo-natus*, Fisch.; *Unio castor*, Eichw.; *Aucella Hausmanni*, Goldf.; *Estheria exigua*, Eichw.; *Beyrichia Pyrrhe*, Eichw.; and remains of ganoid fishes and lizards. These fossils are characteristic of the group, but it contains also the Zechstein fossils, *Stenopora columnaris*, Schl., *Schizodus obscurus*, Gein., *Schizodus rossicus*, Vern., *Nucula Beyrichi*, Bron., *Murchisonia subangulata*, Vern., *Gervillia suciata*, Gein., *Gervillia seratophaga*, Schl., *Hinnites (Avicula) speluncaria*, Schloth., *Arca Kingiana*, Vern., *Clidophorus Pallasi*, Vern., *Terebratula elongata*, Schl., *Productus Cancrini*, Vern., *Camarophoria Schlotheimi*, Buch., and *Spirifer rugulatus*, Kut. The flora of this series is characterised by many Coniferae (among others, the *Uhlmannia Bronnii* and *brevifolia*) Noeggerathiae (*expansa* and *cuneifolia*), ferns, &c. These deposits are thus Permian, and it is worthy of notice that they contain the *Unio umbo-natus* and *castor*, the *Estheria exigua*, and the *Beyrichia Pyrrhe*.

As to the upper mottled marls, which are precisely the subject of the controversy, there was discovered in them but a very few fossils, by MM. Krotoff and Stuckenber, namely, the four just mentioned (*Unio umbo-natus*, *Unio castor*, *Estheria exigua*, and *Beyrichia Pyrrhe*), on the Volga at Tetushi, and the same in the Government of Vyatka, where the marls contain sheets of limestone; besides, M. Krotoff found Zechstein fossils, as *Arca Kingiana*, in the tuff-like limestone on the Volga, which M. Stuckenber considers as belonging to the same series. Finally, there was discovered during a boring at Mount Bogdo (Astrakan), in sandstones and conglomerates, a series of Permian fossils (*Matica minima*, Brown, *Turbonila volgensis*, Golowk., *Gervillia antiqua*, Mün., *Clidophorus Hollebeni*, *Clidophorus Pallasi*, Vern., *Schizodus rossicus*, Vern., *S. obscurus*, Gein., *Nucula Beyrichi*, Brown, *Leda speluncaria*, Gein., and *Hinnites (Avicula) speluncaria*, Schloth. M. Stuckenber, considering the Bogdo sandstones as contemporary with the upper mottled marls, gives to it great weight; but it must be observed that the contemporaneity of the Bogdo marls with the upper mottled marls of the Volga is all but established.

As to the paleontological evidence produced for considering the upper mottled marls as Triassic, namely, those found of the Triassic, *Equisetites columnaris* (*Calamites arenaceus*), *Volzia heterophylla*, and *Estheria minuta*, M. Stuckenber considers it unsatisfactory, and points out that the *Volzia heterophylla* was found rather in Permian deposits; and that Mr. Jones, in his "Monograph of the Fossil Estheriae," considers the *Estheria minuta* of the Russian mottled marls as different from the *E. minuta*, Brongn., and rather like to the *E. tenella* of Jordan, which last belongs to the Permian and Carboniferous of Western Europe. As to the *Calamites arenaceus*, found by Barbot de Marney, F. Römer, in the last edition of his "Letha geognostica," remarks that it is too badly preserved to be a decisive evidence. He concludes, therefore, that contrary to the opinion of almost all Russian geologists, that the mottled marls ought to be considered again as Permian. But, as seen from the above summary, it will be much more prudent to conclude that the whole question still remains open for further investigation.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Rede Lecture was delivered on Tuesday in the Senate House by Prof. Huxley, the subject being "The Origin of the Existing Forms of Animal Life, Construction or Evolution?" There were at least eleven hundred persons present, and amongst them nearly all the University dignitaries now in residence.

In the second part of the Natural Sciences Tripos sixteen men

and one lady are placed in the first class; of this Mr. Harmer of King's College is distinguished in Zoology and Comparative Anatomy; Mr. Reid of Cavendish College in Human Anatomy; and Mr. Sharrington of Caius College in Physiology.

Prof. Hughes has been elected to a Professorial Fellowship at Clare College.

Messrs. P. Frost, I. Todhunter, and Joseph Wolstenholme are to receive the degree of Doctor in Science.

The Woodwardian Professor dissents strongly from the proposal to place the Sedgwick Museum on the Downing Street site in front of the new museums.

SCIENTIFIC SERIALS

The *Journal of Anatomy and Physiology* for April, 1883, contains:—A contribution to the study of *Spina bifida*, encephalocele, and anencephalus, by Prof. Cleland (Plates 11 and 12).—On the minute structure of the palatine nerves of the frog, and the termination of nerves in blood-vessels and glands, by Prof. W. Stirling and J. F. Macdonald (Plate 13).—On the lymphatics of Periosteum, by Drs. George and F. Elizabeth Hoggan (Plate 14).—The brachial plexus of the macaque monkey, and its analogy with that of man, by W. T. Brooks.—A case of primary sarcoma of the pleura, by R. W. Greenish (Plate 15).—Infiltrating carcinoma of the breast, by Dr. G. Barling.—Observations of the diameters of human vertebræ in different regions, by Dr. R. J. Anderson.—On a simple form of Lippman's capillary electrometer useful to physiologists, by Prof. McKendrick.—On so-called sponge-grafting, by Drs. K. Franks and P. S. Abraham (Plate 16).—The valvular action of the larynx, by Drs. T. L. Brunton and T. Cash.—Origin of the internal circumflex from the deep epigastric artery, by Dr. A. Thomson.—On cervical ribs and the so-called bicipital ribs in man in relation to the corresponding structures in the Cetacea, by Prof. Turner.—On a new form of ether microtome, by Dr. Cathcart.—On right-sided sigmoid flexure and rectum, by Dr. E. E. Maddox.—A note to Mr. Haswell's paper on myology of pigeon.

The *Quarterly Journal of Microscopical Science* for April, 1883, contains:—On the anatomy and development of *Peripatus capensis*, by the late Prof. F. M. Balfour, edited by Professors Moseley and Sedgwick (Plates 13 to 20).—On a morphological variety of *Bacillus anthracis*, by Dr. E. Klein, with notes thereon by Prof. Ray Lankester (Plate 21).—Note on a pink Torula, by H. Marshall Ward (Plate 22).—On double staining nucleated blood corpuscles with anilin dyes, by Dr. V. Harris.—Some recent researches on the continuity of the protoplasm through the walls of vegetable cells, by W. Gardiner.—Review of recent researches on Spermatogenesis, by J. E. Bloomfield.—Note on a minute point in the structure of the spermatozoon of the newt, by G. F. Dowdeswell.—On the existence of Spengel's olfactory organ and of paired genital ducts in the pearly nautilus, by Prof. Ray Lankester and A. G. Bourne.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 12.—"On a New Crinoid from the Southern Sea." By P. Herbert Carpenter, M.A., Assistant Master at Eton College. Communicated by W. B. Carpenter, C.B., M.D., F.R.S.

Among the collections of the late Sir Wyville Thomson, a small *Comatula* has recently been discovered which was dredged by the *Challenger* at a depth of 1800 fathoms in the Southern Sea. Although it is unusually small, the diameter of the calyx being only 2 mm., the characters presented by this form are such as to render it by far the most remarkable among all the types of recent Crinoids, whether stalked or free. The name proposed for it is *Thaumatocrinus renovatus*.

But it is distinguished by four striking peculiarities:—

- (1.) The presence of a closed ring of basals upon the exterior of the calyx.
- (2.) The persistence of the oral plates of the larva, as in *Hyocrinus* and *Rhizocrinus*.
- (3.) The separation of the primary radials by interradials which rest on the basals.
- (4.) The presence of an arm-like appendage on the interradial plate of the anal side.

Taking these in order—

- (1.) No adult *Comatula*, except the recent *Atelerinus* and

some little-known fossils, has a closed ring of basals; and even in *Atelocrinus* they are quite small and insignificant.

(2.) In all recent *Comatulae*, in the *Pentacrinidae*, and in *Bathycrinus*, the oral plates of the larva become resorbed as maturity is approached. In *Thaumatoocrinus*, however, they are retained, as in *Hycrinus*, *Rhizocrinus*, and *Holopus*, representatives of three different families of Neocrinoids.

(3.) There is no Neocrinoid, either stalked or free, in which the primary radials remain permanently separated as they are in *Thaumatoocrinus*, and for a short time after their first appearance in the larva of ordinary Crinoids. The only Palaeocrinoids presenting this feature are certain of the *Rhodocrinidae*, e.g. *Reteocrinus*, *Rhodocrinus*, *Thylacocrinus*, &c. In the two latter and in the other genera which have been grouped together with them into the section *Rhodocrinites* there is a single interradial intervening between every two radials, and resting on a basal just as in *Thaumatoocrinus*. But in the Lower Silurian *Reteocrinus* the interradial areas contain a large number of minute pieces of irregular form and arrangement.

(4.) It is only, however, in *Reteocrinus* and in the allied genus *Xenocrinus*, Miller, which is also of Lower Silurian age, that an anal appendage similar to that of *Thaumatoocrinus* is to be met with.

Of the four distinguishing characters of *Thaumatoocrinus*, therefore, one appears in one or perhaps in two genera of *Comatulae*; another is not to be met with in any *Comatula*, though occurring in certain stalked Crinoids; while the two remaining characters are limited to one family of the Palaeocrinoids, one of them being peculiar to one or at most two genera which are confined to the Lower Silurian rocks.

Their reappearance in such a specialised type as a recent *Comatula* is therefore all the more striking.

Geological Society, May 23.—J. W. Hulke, F.R.S., president, in the chair.—Ernest Le Neve Foster and Richard Bullen Newton were elected Fellows of the Society.—The following communications were read:—On the basalt glass (tachylite) of the Western Isles of Scotland, by Prof. J. W. Judd, F.R.S., Sec.G.S., and G. A. J. Cole, F.G.S. Basalt glass or tachylite is a rare rock, although very widely distributed. In the Western Isles of Scotland it has, by the authors of the paper, been detected in five localities only, namely, Lamlash (Holy Isle) near Arran, the Beal near Portree in Skye, Gribun and Sorne in Mull, and Scarpdale in Raasay. Basalt glass is always found in the Hebrides as a selvage to dykes, though elsewhere it has been described as occurring under other conditions where rapid cooling of basaltic lava has taken place. Some of the varieties of basalt glass in the Hebrides differ from any hitherto described by their high specific gravity (2·8 to 2·9) and by their low percentage of silica (45 to 50). This basalt glass is frequently traversed by numerous joints; it is occasionally finely columnar, and sometimes perlitic in structure. From the acid glasses (obsidian) it is distinguished by its density, its opacity, its magnetic properties, and especially by its easy fusibility, from which the name of tachylite is derived. By its greater hardness it is readily distinguished from its hydrated forms (palagonite, &c.). In its microscopic characters basalt glass is found to resemble other vitreous rocks; thus it exhibits the porphyritic, the banded and fluidal, the spherulitic, and the perlitic structures. In the gradual transition of this rock into basalt, all the stages of devitrification can be well studied. The difference between these locally developed basalt glasses and the similar materials forming whole lava-streams in the Sandwich Islands was pointed out in the paper, and the causes of this difference were discussed. It was argued that the distinction between tachylite and hyalolomelane, founded on their respective behaviour when treated with acids, must be abandoned, and that these substances must be classed as rocks and not as mineral species; the name basalt glass was adopted as best expressing their relations to ordinary basalt, the term tachylite being applied to all glasses of basic composition and being used in contradistinction to obsidian.—On a section recently exposed in Baron Hill Park, near Beaumaris, by Prof. T. G. Bonney, F.R.S., Sec.G.S. The author, about three years since, observed some imperfect exposures of a felsitic grit in the immediate vicinity of the normal schists of the district in a road which leads from Beaumaris cemetery to Llandegfan; but last summer had the opportunity, through the courtesy of Sir R. B. Williams, of examining the cuttings made in constructing a new drive, which runs through Baron Hill Park, very near the above outcrops. After tracing

the normal schists along the steep scarp of the hill, came, after an interval of about 60 yards, covered by soil and vegetation, to a massive gray grit consisting of quartz, felsite, and minute fragments of compact felsite, which now and then attain a larger size, being an inch or so across. These grits, which pass occasionally into hard compact mudstones (probably more or less of volcanic origin), can be traced for some 350 yards to the neighbourhood of the above-mentioned road, which is crossed by a bridge; and a short distance on the other side of this is a considerable outcrop of the grit, which in places becomes coarsely conglomeratic, containing large fragments of the reddish quartz-felsite so common on the other side of the straits, in the beds at or below the base of the Cambrian series. The schists appear to dip about 20° E.S.E., the grits about 25° E. The author, after describing the microscopic structure of the various rocks noticed, pointed out that this section, though the junction of the two rocks is probably a faulted one, has an important bearing on the question of the age of the Anglesey schists, micaeuous and chloritic. The Survey regards them as altered Cambrian; it has even been suggested that they may be of Bala age; others have regarded them as Pebidian. Now the felsitic grits and conglomerates cannot be newer than the Cambrian conglomerate of the mainland, regarded by Prof. Hughes as the base of the true Cambrian, and are probably older, corresponding with some part of the series between it and the great masses of quartz-felsite which are developed near Llyn Padarn and Port Dinorwig, which series lithologically and stratigraphically corresponds with the typical Pebidian of Pembrokeshire. Hence, as the Anglesey schists are in the full sense of the term metamorphic rocks, and the "Pebidian" but slightly altered, this section shows that the former must be much older than the latter, and so be distinctly Archaean.—On the rocks between the quartz-felsite and the Cambrian series in the neighbourhood of Bangor, by Prof. T. G. Bonney, F.R.S., Sec.G.S. This district has already been the subject of papers by the author (*Quart. Journ. Geog. Soc.*, vol. xxxiv. p. 137), and by Prof. Hughes (vol. xxxv. p. 682), who differs from him in restricting the series between the quartz-felsite and Cambrian conglomerate to little more than the bastard slates and green breccias of Bangor mountain. The author has traced on the south-east side of the Bangor-Caernarvon road a well-marked breccia containing fragments of purple slate mixed with volcanic materials, below the above-named Bangor series, for more than a mile. At a lower level he has traced another well-marked breccia, chiefly of volcanic materials, for half a mile; and, lastly, a grit and conglomerate, apparently resting on the quartz-felsite named above, composed of materials derived from it. This has been traced on both sides of the road mentioned above for nearly two miles. For these and for other reasons given in the paper, the author is of opinion that, as he formerly maintained, there is a continuous upward succession on the south-east side of the road, from the quartz-felsite at Brithdir to the Cambrian conglomerate on Bangor mountain. The district on the north-west side of the road is so faulted that he can come to no satisfactory conclusions. The author is in favour of incorporating the above-named quartz-felsites with the overlying beds as one series, corresponding generally with the Pebidian of South Wales; older than the Cambrian, though probably not separated from it by an immense interval of time. An analysis of the Brithdir quartz-felsite by Mr. J. S. Teall, was given, from which it appeared that the rock corresponds very closely with the "devitrified pitchstone" of Lea rock in the Wrexham district, described by Mr. Allport, but differs considerably in composition from those in the Ordovician rocks of North Wales.

EDINBURGH

Royal Society, May 21.—Mr. Robert Gray, vice-president, in the chair.—Obituary notices were read of Sheriff Hallard, Dr. John Muir, Friedrich Wöhler, Sir J. Rose Cormack, M.P., and Dr. Morehead. Mr. John Aitken, in a note on the moon and the weather, observed that the phenomenon of the old moon in the new moon's arms was not always visible in a very clear atmosphere, but that other meteorological conditions seem to be requisite. He suggested that the earthshine might be greatly intensified by a cloud-laden atmosphere to the west of the observer.—Mr. D. B. Dott read a paper on the acids of opium, in which he stated that, contrary to the general opinion, the principal acid in opium, judged by its acidifying powers, is sulphuric and not meconic acid, a considerable portion of the

morphia being always combined with the sulphuric acid.—Prof. Tait gave some results of direct observations of the effect of pressure on the maximum density-point of water. The experiments were a modification of the well-known Hope experiment. A glass vessel of water with a self-registering thermometer at the bottom and a mass of ice at the top was placed inside the water (at 50° F.) of the large hydraulic press. Under a pressure of 3 tons weight per square inch, the thermometer fell to 33° F., whereas at the ordinary atmospheric pressure, but under otherwise similar circumstances, the temperature registered never fell below 41° F.

PARIS

Academy of Sciences, May 21.—M. E. Blanchard, president, in the chair.—Observations of the small planets made with the large meridian of the Paris observatory during the first quarter of the year 1883, communicated by M. Lœwy.—On the critical point of soluble gases, by J. Jamin. The critical point is defined to be the temperature at which a liquid and its saturated vapour have the same density. At and beyond this point the fluid and vapour become fused in one, and all latent heat disappears.—Extract from a memoir on the composition of combustible mineral substances, by M. Boussingault. The proportions are given of the carbon, hydrogen, oxygen, and nitrogen contained in the substances analysed—the bitumen of the Chinese fire-pits and Dead Sea, the Egyptian asphalt, fossil resins, and the anthracites and other coals of South America and France. A method is proposed for eliminating the hydrogen, oxygen, and other impurities from graphite, and thus reducing it, like the diamond, to pure carbon.—The scientific expedition of the *Talisman* to the Atlantic Ocean, by M. Alphonse Milne-Edwards. The *Talisman* sailed from Rochefort on June 1, and will visit the Canaries, Cape Verd Islands, Azores, and intermediate waters.—On the discussion recently raised by the Commission of the Turin Veterinary School, touching the state of the blood of a sheep subjected to carbonic vaccination when examined within a few hours of death and the day after death, by M. Pa-teur.—Note by Admiral Pâris accompanying the presentation of his work on the "Naval Museum in the Louvre."—A new method of synthesis for the alkylnitrous acids, by G. Chancel.—On the part respectively played by oxygen and heat in attenuating the carbonic virus by the method of M. Pasteur, by M. A. Chauveau.—On the treatment of the water used in wool-washing, by MM. Delattre. This water yields 4.50 per 100 of a very dry potassium, or a total of 270,000 kilograms, valued at 4300/, on the 6,000,000 kilograms of wool annually washed in France. But from this must be deducted 1000/ for the cost of treatment.—On the algebraic functions of Fuchs, by M. H. Poincaré.—On the theory of Euler's integrals, by M. Bourguet.—On the resistance of the atmosphere in very slow oscillatory movements, by M. J. B. Baille.—On the deformation of polarised electrodes, by M. Gouy.—On the electrodynamic interference of alternant currents, by M. A. Oberbeck.—On the sesquisulphuret of phosphorus, by M. Isambert.—On some double salts of lead, by M. G. André.—On the solubility of strychnine in acids, by MM. Hanriot and Blarez.—On a saccharine substance extracted from the lungs and phlegm of consumptive patients, by M. A. G. Pouchet.—On a deposit of quaternary mammals in the neighbourhood of Argenteuil (Seine-et-Oise), by M. Stan. Meunier. Here the author recently discovered remains of the elephant, *Rhinoceros tichorhinus*, cave hyæna, horse, reindeer, and a member of the ox family, apparently *Bison priscus*.—Vegetation of the vine at Calèves, near Nyon, Switzerland, by M. Eugène Risler.

June 4.—M. Blanchard in the chair.—The following papers were read:—On the possibility of increasing in a great measure the precision of the observations of the eclipses of Jupiter's satellites, by A. Cornu.—On the solubility of sulphide of copper in alkaline sulphomolybdates, by M. Debray.—On the solution of certain problems of cosmography by means of graphic tables, by MM. Lalanne and Ed. Collignon.—M. A. Caligny presented to the Academy his work entitled: "Theoretical and Experimental Researches concerning the Oscillations of Water, and the Hydraulic Machines with Oscillating Liquid Columns."—On recent scientific results obtained regarding the etiology of and preventatives from cholera, by A. Faivel.—Researches on typhoid fever in Paris during the period October 19, 1882, to May 15 a.c., by M. de Pietra-Santa.—On an apparatus for obtaining low temperatures which can be graduated at pleasure, by P. Gibier.—On the hyposulphides of phosphorus, by M. Isambert.—On the sesquisulphide of phosphorus, by G. Lemoine. —Reply to M. le

Goarant de Tromelin regarding the electric log, by M. Fleuriais.—On glass-blowing by means of mechanically-compressed air, by M. Appert.—On the observations of Brooks-Swift comet (*a* 1883) made at Paris Observatory, by G. Bigourdan.—On the development of the perturbating function, by B. Baillaud.—On the uniform functions of two analytical points which are left invariable by an infinity of rational transformations, by M. Appell.—On uniform functions, by J. Farkas.—On a correction of the stereotyped formula in the preface of Callet, by M. Em. Barbier.—Practical rules for substituting certain closed curves for a given arc, by H. Léauté.—On passive mechanical power, interior resistance, and other points relating to electro-magnetism, by G. Cabanelas.—On the freezing point of acid solutions, by F. M. Raoult.—Comparison of the evaporation of fresh water and sea water at different degrees of concentration; consequences relating to a sea in the interior of Algeria, by M. Dieulafait.—Notes on the preceding communication, by M. Jamin.—Thermal studies on the solution of hydrofluoric acid in water, by M. Guntz.—On the transformation of glycol into glycolic acid, by M. de Forcrand.—Researches on the production of crystallised borates in the wet way, by A. Ditte.—On the reaction of sulphide of lead upon metallic chlorides, by A. Levallois.—On the burning of gypsum, by H. le Chatelier.—On an acid resulting from the oxidation of strychnia, by M. Hanriot.—On the life-capacity of the monstrous embryos of chickens, by M. Daresté.—On the artificial production of the inversion of the viscera or "heterotaxy" in chicken embryos, by MM. Hermann Fol and St. Warynski.—Observations on blastogenesis and alternating generation in *Salpa* and *Pyrosoma*, by L. Joliet.—On the localisation of virus in wounds and on the mode of its dissemination in the organism, by G. Colin.—Experimental researches on the lesion of the spinal marrow, determined by the hemisection of that organ, by E. A. Homén.—On the mechanical organisation of the pollen-grain, by J. Vesque.—Note on the life and work of Prof. da Costa Simões of Coimbra, by Eduardo Abren.—On a method of utilising sewage water, by MM. Delattre and Pinot.

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